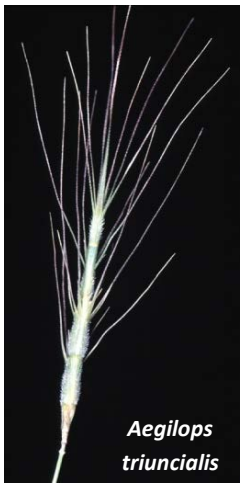
Aegilops cylindrica Host.; jointed goatgrass
Aegilops triuncialis L.; barb goatgrass

Jointed goatgrass and barb goatgrass


Aegilops triuncialis

Family: Poaceae
Range: Jointed goatgrass is found in all western states. Barb goatgrass is found only in California and Oregon, primarily in northern California, especially the Central Valley foothills northward to southern Oregon. Both are expanding their distribution.
Habitat: Disturbed and undisturbed grasslands, oak woodlands, fields, rangelands, pastures, and roadsides. Barb goatgrass tolerates serpentine and hard, shallow, dry, gravelly soils but usually is not found in chaparral. Jointed goatgrass also infests grain fields, especially winter wheat.
Origin: Both species are native to Mediterranean Europe and western Asia.
Impacts: Plants have high silica content, resulting in a persistent thatch that can suppress other species. Barb goatgrass is late-maturing and drought-tolerant, enabling it to occupy and form monocultures in marginal environments. Tough seedheads with long barbed awns are inconvenient for humans and can injure livestock, even fatally. Jointed goatgrass joints are difficult to separate from wheat grains, and contaminated wheat harvests are reduced in quality and value.
Western states listed as Noxious Weed: *A. cylindrica*, Arizona, California, Colorado, Idaho, New Mexico, Oregon, Washington; *A. triuncialis*, California, Oregon
California Invasive Plant Council (Cal-IPC) Inventory: *A. triuncialis*, High Invasiveness

Jointed goatgrass and barb goatgrass are late-maturing winter annual grasses with spikes that resemble those of winter wheat. Both species can hybridize with wheat. Unlike wheat, goatgrass spikes break apart into hardened sections called joints.

Goatgrass plants grow up to 20 inches tall. Jointed goatgrass foliage looks similar to winter wheat, but blades, auricles, ligules, and leaf sheaths have evenly spaced, fine hairs along the margins. Barb goatgrass has gray-green foliage, spreading to erect, usually sparsely covered with fine hairs.

Goatgrass seedheads have spikelets arranged alternately along a zigzag rachis. The spikelets are large, hard, and cylindrical to cone-shaped, with long awns. Barb goatgrass, in particular, has stiff, barbed awns; mature seedheads break off whole and can work their way into fur or clothing. The goatgrasses go to seed later than most annual grasses, usually in late spring to early summer. Jointed goatgrass seedheads are 1 to 5 inches long, and barb goatgrass seedheads are 1 to 2.5 inches long. At maturity, heads turn reddish to purple and then dry to a straw color. Eventually the seedheads break apart into joints (spikelets attached to a piece of rachis). Once on the ground, the joints often can survive field burns because of their hard coat. The spikes and joints disperse by attaching to animals, humans, equipment or vehicles.

Seeds germinate in fall and winter, sometimes while still attached to the joints. In fact, joints often remain attached to the lower shoot of dug-up seedlings. Barb goatgrass seeds can remain viable for 2 years or more on the soil, while jointed goatgrass seeds can remain viable for 3 to 5 years.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, disking)	Hand pulling or hoeing small infestations is effective, if the roots are pulled and air-dried. Mowing can reduce seed production, but timing is critical. Mowing should occur after flowering, but before goatgrass seeds reach the soft boot stage. Early mowing will result in new tiller growth, and late mowing will only spread viable seed. Tillage may be used in certain situations. In agricultural fields, sweep tillage or V-blade tillage may be used during fallow periods. Conventional deep plowing will bury goatgrass seed beyond emergence depth. However, buried seed may be viable for up to 5 years, and secondary tillage may bring goatgrass seed back up to a successful

	emergence depth (< 5 in).
Cultural	Heavy grazing throughout the growing season and high intensity/short duration grazing periodically during the growing season appear to increase plant density. Both species mature later than most rangeland annual grasses, providing a window for controlling goatgrass seed production. It is important to burn before the joints disarticulate, to ensure seed kill. Burning will not effectively control seed on the soil surface. Goatgrass germination may increase the year after burning due to increased fertility and light penetration. Therefore, a second year management strategy must be incorporated, and the population should be monitored for several years. In rangeland, burning the first year followed by herbicide and spring seeding the second year may improve barb goatgrass control. For jointed goatgrass in winter wheat, burning fields after harvest can reduce germination of joints at the surface by 90% or more.
Biological	Naturally occurring bacterial strains that infect annual brome and jointed goatgrass, but have no effect on wheat, have been isolated in Kansas and Washington. These bacteria may soon be used in a bio-herbicidal approach for jointed goatgrass control in winter wheat. However, their utility in rangelands has not been explored.

CHEMICAL CONTROL

The following specific use information is based on published papers and reports by researchers and land managers. Other trade names may be available, and other compounds also are labeled for this weed. Directions for use may vary between brands; see label before use. Herbicides are listed by mode of action and then alphabetically. The order of herbicide listing is not reflective of the order of efficacy or preference.

AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup*, *Accord XRT II*, and others	**Rate:** 1 qt product (*Roundup ProMax*)/acre for young plants < 6" tall (1.1 lb a.e./acre); 1.5 to 4 qt product (*Roundup ProMax*)/acre (1.7 to 4.5 lb a.e./acre) for larger plants or plants under stress. **Timing:** Postemergence in late winter to early spring. Apply to rapidly growing, non-stressed plants before flowering. If possible, apply before desirable perennials have emerged. According to label recommendations, seedling goatgrass can be selectively suppressed in pasture with 5 to 11 oz *Roundup ProMax* (or other trade name)/acre. **Remarks:** Glyphosate has no soil activity and is nonselective, so may kill desirable competitors. Its effectiveness is increased by addition of ammonium sulfate.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapic *Plateau*	**Rate:** 4 to 6 oz product/acre (1 to 1.5 oz a.e./acre) **Timing:** Preemergence in fall or postemergence in early spring. **Remarks:** Mixed selectivity, tending to favor Asteraceae and some grasses. Safe for most native grasses, but higher rates may suppress seed of some cool-season grasses. Use lower rates for dry climates and low leaf litter and higher rates as moisture increases and/or leaf litter increases. Use methylated seed oil surfactant. Imazapic has long soil residual activity. Imazapic is not registered for use in California.
Propoxycarbazone-sodium *Canter R+P*	**Rate:** 1.2 oz product/acre (0.84 oz a.i./acre) **Timing:** Postemergence from the 2-leaf to 2-tiller stage when plants are growing rapidly. **Remarks:** Propoxycarbazone is a broad-spectrum herbicide that will control many species. It will provide only partial control of jointed goatgrass and perhaps barb goatgrass. Perennial grass species vary in tolerance. A non-ionic surfactant should be added at 0.25 to 0.5% v/v solution.
Sulfometuron *Oust* and others	**Rate:** 1.33 to 2 oz product/acre (1 to 1.5 oz a.i./acre) **Timing:** Preemergence or early postemergence in fall or in late winter after emergence but before goatgrass is 3 inches tall. **Remarks:** Sulfometuron has mixed selectivity. It is fairly safe on native perennial grasses, especially wheatgrass. Other desirable grasses may be stunted, stressed, or injured. Good for revegetation use. Should be used with a surfactant for early postemergence treatments. Sulfometuron has fairly long soil residual activity. Do not let spray drift onto sensitive crops. May move long distances in dry light windblown soils.
Sulfometuron + chlorsulfuron *Landmark XP*	**Rate:** 1.5 oz product/acre **Timing:** Preemergence, in fall or after soil thaws in spring. **Remarks:** See sulfometuron.

RECOMMENDED CITATION: DiTomaso, J.M., G.B. Kyser et al. 2013. *Weed Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.